

10/538653

JC09 Rec'd PCT/PTO 10 JUN 2009

THE FOLLOWING IS THE ENGLISH TRANSLATION OF THE  
AMENDMENTS TO THE CLAIMS OF THE INTERNATIONAL  
APPLICATION UNDER PCT ARTICLE 19:

AMENDED SHEETS (Pages 32-36).

CLAIMS

1. An automobile power unit comprising:

an engine;

a motor that transmits a dynamic force to the engine and starts the engine, and that receives a dynamic force of the engine during rotation of the engine and generates a power;

a power conversion circuit that has at least two DC voltage input/output terminals and transmits a power to the motor;

a battery that is connected to the power conversion circuit;

an energy storage source that is connected in series to the battery and stores energy; and

a DC/DC converter that is composed of at least two switching elements, that charges the energy storage source by boosting a voltage of the energy storage source, and that recovers energy in the energy storage source to the battery by lowering a voltage of the energy storage source,

the automobile power unit being characterized in:

that the switching elements of the DC/DC converter connect high-voltage-side ones of the DC voltage input/output terminals of the power conversion circuit to a high-voltage-side terminal of the battery; and

that when the motor receives a dynamic force of the engine,

generates a power, and charges the battery through the power conversion circuit and the DC/DC converter, the switching elements provided in the DC/DC converter are constantly turned on.

2. The automobile power unit according to claim 1, characterized in that after the engine has been started by the motor and before the power generation is carried out, the DC/DC converter operates the energy storage source in a voltage-lowering manner and recovers energy stored in the energy storage source to the battery.

3. The automobile power unit according to claim 1 or 2, characterized in that the energy storage source is charged during stop, pre-stop idling, or deceleration of the vehicle.

4. The automobile power unit according to any one of claims 1 to 3, characterized in that each of the switching elements of the DC/DC converter is constituted by a semiconductor element.

5. The automobile power unit according to any one of claims 1 to 3, characterized in that each of the switching elements of the DC/DC converter is constituted by a parallel circuit composed of a semiconductor element and a mechanical switch.

6. The automobile power unit according to any one of claims

1 to 5, characterized by further comprising switches connected between the high-voltage-side terminal of the energy storage source and the high-voltage-side ones of the DC voltage input/output terminals of the power conversion circuit.

7. The automobile power unit according to any one of claims 1 to 6, characterized in that the energy storage source is charged from the battery via the DC/DC converter before the engine is started by the motor.

8. The automobile power unit according to claim 6 or 7, characterized in that energy is supplied from the battery to the power conversion circuit in a first half of a time period in which the engine is started by the motor, and in that energy is supplied from the battery and the energy storage source to the power conversion circuit in a second half of the time period.

9. The automobile power unit according to any one of claims 6 to 8, characterized in that the switches connected between the high-voltage-side terminal of the energy storage source and the high-voltage-side ones of the DC voltage input/output terminals of the power conversion circuit are constituted by semiconductor elements.

10. The automobile power unit according to any one of claims 1 to 9, characterized in that the switching element of the DC/DC converter is constituted by a mechanical switch.

11. The automobile power unit according to any one of claims 6 to 8, characterized in that the switches connected between the high-voltage-side terminal of the energy storage source and the high-voltage-side ones of the DC voltage input/output terminals of the power conversion circuit are constituted by mechanical switches.

12. An automobile power unit comprising:

an engine;

a motor that transmits a dynamic force to the engine and starts the engine, and that receives a dynamic force of the engine during rotation of the engine and generates a power;

a power conversion circuit that has at least two DC voltage input/output terminals and transmits a power to the motor;

a battery that is connected to the power conversion circuit; and

a DC/DC converter that is composed of at least two switching elements, that supplies the power conversion circuit with a power from the battery by boosting a voltage thereof,

the automobile power unit being characterized in:

that the switching elements of the DC/DC converter connect high-voltage-side ones of the DC voltage input/output terminals of the power conversion circuit to a high-voltage-side terminal of the battery; and

that when the motor receives a dynamic force of the engine, generates a power, and charges the battery through the power conversion circuit and the DC/DC converter, the switching elements provided in the DC/DC converter are constantly turned on.

13. The automobile power unit according to claim 12, characterized in that each of the switching elements of the DC/DC converter is constituted by a semiconductor element.

14. The automobile power unit according to claim 12, characterized in that the switching element of the DC/DC converter is constituted by a mechanical switch.

15. The automobile power unit according to any one of claims 1 to 14, characterized in that a choke coil constituting the DC/DC converter is a choke coil of a magnetic field biasing type in which a magnet is disposed inside a core.